

## **REMARKS**

Favorable reconsideration and allowance of the claims of the present application are respectfully requested.

Before addressing the specific grounds of rejection raised in the present Office Action, applicants have amended Claims 1, 3, 5, 7, 13, 17, 27, 28, 48 and 49. Specifically, applicants have amended Claims 1 and 49 to positively recite that the step of implanting oxygen ions comprises a base oxygen implant followed by a second oxygen implant that is performed at a lower temperature than the base oxygen implant. Support for the above amendment to Claims 1 and 49 is found at Page 10, line 11-Page 12, line 6 as well as Claim 2. The inclusion of the subject matter from Claim 2 into Claim 1 made that independent claim redundant; therefore, applicants have cancelled Claim 2. Because Claim 2 was cancelled, it was necessary for applicants to amend Claims 3, 5, 7, 13 and 17 by changing the dependency of each of the aforementioned claims from Claim 2 to Claim 1.

Applicants have also amended Claims 1 and 49 to positively recite that annealing is performed at a temperature of about 1250°C or greater. Support for this amendment to Claims 1 and 49 is found at Page 13, lines 13-14 as well as Claim 27. Since the temperature range recited in Claim 27 was added to Claim 1, applicants have deleted the temperature range from Claim 27. Applicants also observe that the inclusion of the temperature range previously recited in Claim 27 necessitated the changing of the dependency of Claim 28 from Claim 27 to Claim 1.

Applicants have cancelled Claim 50 without prejudice or disclaimer and have added new Claims 51 and 52 which are supported by Page 10, line 11-Page 12, line 6 as well as original Claim 2.

An amendment to Claim 48 was made to address a minor typographical error that was present in the previous listing of the claims.

Applicants respectfully submit that the above amendments to the claims do not introduce new matter to the specification of the instant application. Applicants thus respectfully request entry of the above amendments to the claims.

In the present Office Action, Claims 1-22, 25-36, 40 and 48-50 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures of U.S. Patent No. 6,090,689 to Sadana, et al. ("Sadana '689"), U.S. Patent No. 5,534,446 to Tachimori, et al. ("Tachimori, et al.") and U.S Patent No. 5,930,643 to Sadana, et al. ("Sadana '643").

Applicants respectfully submit that the combined disclosures of Sadana '689, Tachimori, et al., and Sadana '643 do not render the claimed methods obvious. Specifically, Sadana '689, Tachimori, et al. and Sadana '643 do not teach or suggest applicants' claimed methods which include implanting oxygen ions into a Si-containing substrate using a base ion implant step and a second implant step that is performed at a lower temperature than the base implant such that during a subsequent anneal step a buried oxide is formed, annealing the Si-containing substrate containing said implanted oxygen ions using the claimed ambient gas that includes O<sub>2</sub> and one of N<sub>2</sub>, He, Kr, and H<sub>2</sub> at a temperature of about 1250°C or greater to form said buried oxide, wherein said annealing is continued until tile or divot defects present at a top surface of the superficial

Si-containing layer are reduced to allow optical detection of any other defect that has a lower density than the tile or divot defect and then optically detecting the other defects.

Applicants first observe that none of the applied references teaches or suggests that their disclosed method can be used to reduce tile or divot defects that are present in the top superficial Si-containing layer such that any other defect that has a defect density lower than tile or divot defects can be optically detected. This feature of the claimed invention is not disclosed, nor is it suggested in any of the disclosures applied in the present Office Action.

Applicants submit that the objective in Sadana '689 is to overcome the buried isolated islands of silicon oxide that form a discontinuous buried oxide layer. Sadana '689 does mention at Col. 5, lines 24-30 that defects are present in the top SOI layer, but fails to mention that tile or divot defects are present. Applicants observe that the method disclosed in Sadana '689 is different from the claimed invention. In particular, Sadana '689 requires that a first anneal which is capable of forming a mixture of defective single crystal silicon and polysilicon silicon be employed. From the disclosure of Sadana '689, the first anneal is performed at a temperature from 800° to 1200°C, preferably 1000°C. See Col. 4, line 66-Col. 5, line 15. Sadana '689 states that "[T]he mixture of defective single crystal single and polycrystalline silicon in layer 20 acts as a template upon which to form the buried oxide." Also, it is stated that "[T]he mixture of defective single crystal silicon and polycrystalline silicon in layer 20 serves to provide both sites for nucleating oxide growth and paths for rapid diffusion of oxygen along grain boundaries." Hence, the disclosure of Sadana '689 requires the first anneal step be employed in order to meet the objectives set forth therein.

Applicants observe that the claimed annealing step is performed at a high temperature (of about 1250°C or greater). Thus, the claimed invention does not utilize the disclosed first annealing step of Sadana '689 which is performed at lower temperatures than presently recited in the claims. Applicants observe that since a first annealing step performed at temperatures from 800°C to 1200°C is essential to the disclosure of Sadana '689 any combination of Sadana '689 with Tachimori, et al. and Sadana '643 would require this low temperature first anneal.

Tachimori, et al. also do not teach or suggest a method of forming a SOI substrate material which is capable of reducing the tile or divot defects as presently claimed. The objective in Tachimori, et al. is to provide a process for forming an SOI substrate material in which the conditions are capable of increasing the thickness of the buried oxide, while extinguishing the defects lacking in oxygen atoms in the buried oxide. The Tachimori, et al. process utilizes a single implant and the anneal is performed utilizing a partial pressure of oxygen of about  $5 \times 10^3$  Pa or more. Applicants note that in their claimed invention a two step implant process is recited and because no recitation is given in either the specification or claims of the partial pressure of oxygen, a normal pressure is used. Applicants submit that the combined disclosures of Sadana '689 and Tachimori, et al. would result in a method of forming an SOI substrate utilizing at least the low temperature anneal disclosed in Sadana, et al. prior to a second higher temperature anneal, wherein at least one of the anneals includes the partial pressure of oxygen recited in Tachimori, et al. Applicants observe that the prior art disclosed in Tachimori, et al. uses a single implant and a normal O<sub>2</sub> pressure anneal.

Sadana '643 provides a method of forming a defect induced buried oxide in which the defect induced buried oxide has improved electrical qualities. There is no disclosure in Sadana '643 which teaches or suggests that the disclosed method can be used in reducing tile and divot defects as presently claimed. Applicants observe that various ambients are mentioned, however, the disclosure of Sadana, et al. does not teach or suggest which of the ambients can be used to reduce tile or divot defects in the SOI layer. Applicants observe that some of the ambients disclosed in Sadana '643 (as well as Tachimori, et al.) cannot be used to reduce tile or divot defects (See previously submitted 132 Declaration).

Applicants submit that the combined disclosures are defective for the reasons discussed above and that if the teachings were to be combined, the low temperature anneal performed at 800°-1200°C such as taught in Sadana '689 and the recited partial pressure recited in Tachimori, et al. would be required since those steps are essential to both disclosures. Such a process is different from the claimed method recited above in Claims 1 and 49.

Finally, it is not inherent that the number of divot or tile defects formed on the surface of the Si-containing layer can be reduced using the process steps disclosed by the applied references, including Sadana '643, Sadana '689, and Tachimori, et al. The Federal Circuit has held that inherency cannot be based on mere speculation. *See e.g., Continental Can Co. USA, Inc. v. Monsanto Co.*, 848 F.2d 1264, 1269, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991) (inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.") When anticipation is based on inherency of limitations not expressly

disclosed in the assertedly anticipating reference, it must be shown that the undisclosed information was known to be present in the subject matter of the reference. See *Elan Pharmaceuticals, Inc., v. Mayo Foundation for Medical Education and Research*, 304 F.3d 1221, 1228, 64 USPQ2d 1292 (Fed. Cir. 2002) (citing *Continental Can*, 948 F.2d at 1269). The alleged limitation must be necessarily present so that one of ordinary skill would recognize its presence. *Crown Operations International, LTD v. Solutia Inc.*, 289 F.3d 1367, 1377, 62 USPQ2d 1917 (Fed. Cir. 2002). 'The mere fact that a certain thing may result from a given set of circumstances is not sufficient [to establish inherency.]' ... 'That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown.' ' *In re Rijckaet* 9 F.3d 1534, 28 USPQ2d at 1957.

The court in *Elan Pharmaceuticals v. Mayo Foundation for Medical Education and Research* held that when a rejection is based on inherency of limitations not expressly disclosed in the assertedly anticipating reference, it must be shown that the undisclosed information was known to be present in the subject matter of the reference. See *Elan Pharmaceuticals, Inc., v. Mayo Foundation for Medical Education and Research*, 304 F.3d 1221, 1228, 64 USPQ2d 1292 (Fed. Cir. 2002) (citing *Continental Can*, 948 F.2d at 1269). In *Elan Pharmaceuticals* the claim limitation at issue before the court was, "wherein said polypeptide is processed to ATF-betaAPP in a sufficient amount to be detectable in a brain homogenate of said transgenic rodent". It was undisputed that the applied reference made no reference to the formation of "ATF-betaAPP". The court found that the Examiner's applied references were no more than broad teachings and were not directed to the applicants' claimed limitation. *Id.* at 1228. The referenced prior art was described as merely "an invitation to experiment with no assurances of success"

*Id.* Finally, the court stated that a general recitation of known procedures does not defeat the novelty of the invention as produced by the applicant.

Similar to the prior art examined in *Elan Pharmaceuticals*, the referenced prior art cited in the present Office Action does not teach or suggest all of the claimed limitations of the invention. “Facts asserted to be inherent in the prior art must be shown by evidence from the prior art”. In re Dembiczak, 175 F.3d 949, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) (criticizing the hindsight syndrome wherein that which only the inventor taught is used against its teacher). Neither, Tachimori, et al. nor the Sadana, et al. references teach or suggest tile or divot defects, as recited in amended Claims 1 and 49.

Additionally, the combined references of Tachimori, et al. and the Sadana, et al. references, similar to the prior art discussed in *Elan Pharmaceuticals*, at most disclose a general recitation of procedures that were not carried out in a manner in which one of ordinary skill in the art would recognize the unexpected advantages in tile or divot defect reduction achieved using applicants’ method, recited in amended Claims 1 and 49. Therefore, in light of the holding of *Elan Pharmaceuticals*, applicants’ method recited in amended Claims 1 and 49 is not obvious.

In light of the standard established by the Federal Circuit, applicants respectfully request that the § 103 rejection be withdrawn.

Based on the above amendments and remarks, the rejection to the claims under 35 U.S.C. § 103 have been obviated; therefore reconsideration and withdrawal of the instant rejection are respectfully requested.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'LSZ', with a long horizontal line extending to the right.

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